

What is claimed is:

1    1. A variable camshaft timing device for an internal combustion engine having at least  
2       one camshaft comprising:

3       a vane-type rotor having at least one lobe secured to the camshaft for  
4              rotation therewith, the rotor being non-oscillatable with respect to  
5              the camshaft;

6       an annular housing surrounding the rotor and having at least one recess, the  
7              at least one recess having a circumferential extent greater than the  
8              circumferential extent of the at least one lobe and receiving the at  
9              least one lobe, the annular housing being rotatable with the  
10          camshaft and the rotor, and being oscillatable with respect to the  
11          camshaft and the rotor;

12       locking means reactive to engine oil pressure for preventing relative  
13              circumferential motion between the housing and the rotor at one of  
14              a plurality of relative circumferential position of the housing and the  
15              rotor during periods of low engine oil pressure; and

16       at least one metallic strap having an end secured to the annular housing and  
17              an opposed end secured to the rotor for urging the locking means  
18              into locking engagement with the rotor during period of low engine  
19              oil pressure.

1    2. The variable camshaft timing system of claim 1, wherein the annular housing  
2       comprises a first annular array of teeth and wherein the locking means comprises:

3       an annular locking plate, the annular locking plate having a second annular  
4              array of teeth, the second annular array of teeth being in  
5              engagement with the first annular array of teeth in a first position of  
6              the annular locking plate to prevent relative motion between the  
7              housing and the rotor and being out of engagement with the first  
8              annular array of teeth in a second position of the annular locking

9           plate to permit relative circumferential motion between the annular  
10          housing and the rotor;

11          the at least one metallic strap biasing the annular locking plate to the first  
12          position.

1        3. The variable camshaft timing system of claim 2, wherein the annular locking plate is  
2          positioned relative to a longitudinal central axis of the camshaft and is moveable  
3          along the longitudinal central axis of the camshaft between the first position and  
4          the second position.

1        4. The variable camshaft timing system of claim 3, wherein the at least one metallic strap  
2          comprises at least three circumferentially spaced apart metallic straps, each of the  
3          metallic straps having an end secured to the locking plate and an opposed end  
4          secured to the rotor.

1        5. The variable cam shaft timing system of claim 1, wherein the rotor comprises at least  
2          three circumferentially spaced apart vanes, and wherein the annular housing  
3          comprises a like number of circumferentially spaced apart recesses.